

Visual Effects in a Digital World



Karen E. Goulekas



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The final composite featuring six miniature police cars composited over an environment comprised of miniature buildings, CG traffic, and a matte painting. The image was cropped with a 2.35 center extraction for projection. *THE FIFTH ELEMENT* 1997 Copyright © Gaumont. All Rights Reserved. Courtesy of Columbia Pictures.

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(can you guess??)

MOM AND DAD!

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Introduction

Although it has become increasingly commonplace to opt for digital solutions in the creation of visual effects for feature films, the terminology surrounding the technology is far from commonplace.

I often find myself in the situation of attempting to define for directors, producers, or studio executives a particular term or technical approach we are using to create the digital visual effects for a project. However, as I struggle for a simple and clear-cut explanation, I find that I unwittingly introduce many new digital terms that also beg interpretation. Before long, not only have I failed to define the original term being discussed, I have also succeeded in confusing my audience even more, in my attempt to make it all perfectly crystal clear!

Even for those of us who have grown up in the digital arena, it is often a challenge to keep up with the ever-changing language and terminology used in everyday conversation among visual effects professionals. Not only does each software and hardware application and technique come equipped with its own unique language, there is also a complete library of slang and abbreviated terms, often varying from facility to facility, that has become part of an entire new language to learn and understand.

Thus, I saw the need for this book. When I set out to compile a list of terms covering film, computer graphics, live action, and special effects photography, I thought I would come up with about 2,500 terms that would more than cover the vocabulary required to enable visual effects professionals from different disciplines to speak the same language. Was I naive! With over 7,000 terms identified during the year I spent writing this book, I feel as though I could continue adding terms forever! Not a day goes by that I don't think of or hear a new term that qualifies for an entry in this book! Well, I guess there's always the second edition....

My hope is that this book will serve as a quick reference of terms for newcomers to the industry, as well as seasoned professionals who barely have enough time to meet their next deadline, let alone study up on the latest digital breakthroughs and terminology!

Enjoy!

KEG

P.S. Please send comments and feedback to kegvfx@mindspring.com.

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A/B cutting See **A/B editing**.

A/B editing An **editing** method for assembling the original **images** from at least two **rolls** of **film** or **video** by alternating the images from each. See **A/B printing**. *See image below.*

Abby Singer The second-to-last **shot** to be **filmed** for the day. It was named after **Production Manager (PM)** Abby Singer who often announced the last shot of the day only to have the **Director** decide to do another **setup**. See also **martini shot**.

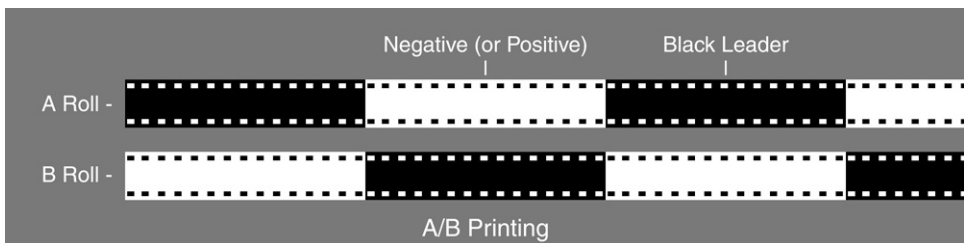
Abekas The brand name for a line of **Digital Disk Recorders (DDR)** owned by **Accom**.

abort To cancel a **computer process** or **command**.

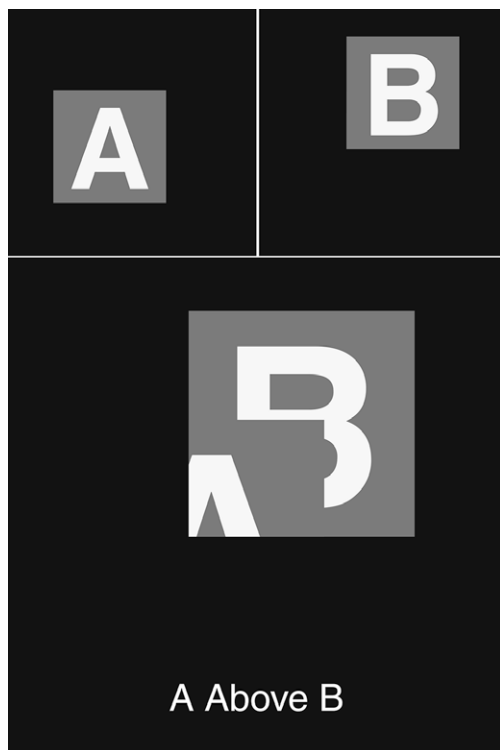
above See **above operation**, *and image on following page.*

above operation A **compositing operation** that layers the **foreground image** over the **background image** but only inside the area covered by the **alpha channel** of the background image. Also called **atop operation**. Opposite of **below operation**. See also **plus above operation**, *image under layering operation and image on following page.*

above the line 1. The portion of a **film budget** that covers expenses that have already been incurred or negotiated before **principal photography**



The A and B rolls used in A and B printing.



begins. Such costs might include the purchase of the **script** or novel and the salaries of the **Director**, **Producer**, and the leading actors. These are typically the most expensive items in the budget. Opposite of **below the line** costs. 2. A term used to describe a credit position that is listed near the top of the credit list hierarchy of a **film**, such as being listed among the principal actors and the Director.

A/B printing A **printing** method that allows multiple rolls of original **film** to be invisibly **spliced** together. **Shots** from the **negative** or **positive** are alternated between each **roll** with **black leader** so that the shots on one roll correspond with the black leader on the other roll. Every other shot on the **A roll** and **B roll** is then printed in consecutive order. In some cases, a C roll and D roll might be used for additional effects. See also **checkerboard cutting**, invisible splice, **cue mark**, and *image on previous page*.

A/B rolls The **rolls** of **film** or **video** used in **A/B printing**. *See image on previous page.*

absolute address A location in **computer memory** or a **peripheral device** that is not referenced to another **address**. Opposite of **relative address**.

absolute coordinates See **absolute location**.

absolute location The location, expressed as **coordinates**, of an **object** relative to the **origin** of its **coordinate system**. Also called **absolute coordinates**. See also **relative coordinates**, **absolute value**.

absolute path The location of a **file** relative to the **root directory**. The **path** begins at the **root** of the **file system** and works down the **directory tree** to locate the requested file. When a file is moved to a new location on the **disk**, any **applications** that were referenced to that file will not be able to find it, and as a result, the new absolute path will have to be updated within each application. See also **relative path**.

absolute pathname See **absolute path**.

absolute rotation The **rotation** of an **object** relative to the **origin** of its **coordinate system**. Opposite of **relative rotation**. See also **absolute transformation**, **absolute location**, **absolute translation**, **absolute scale**.

absolute scale To **scale** an **object** relative to the **origin** of its **coordinate system**. Opposite of **relative scale**. See also **absolute transformation**, **absolute location**, **absolute translation**.

absolute transformation A **transformation matrix** that **positions** an **object** to an **absolute location** within the **coordinate system** in terms of **translation**, **rotation**, **scale**, or any other **transformations** that have been applied. For example, if an **absolute translation** is entered for an object, it will be moved by the specified amount on each **axis** relative to the **origin** of the world. So, if the **world origin** is at (0, 0, 0), and an object whose current position in **3D space** was (4, -15, 12) received an absolute translation value of (30, 57, 100), the object's new position would be (30, 57, 100). Unlike **relative transformations**, absolute transformations do not take into consideration the current position of the object. See also **absolute rotation**, **absolute scale**.

absolute translation The **translation** of an **object** relative to the **origin** of its **coordinate system**. Opposite of **relative translation**. See also **absolute transformation**, **absolute location**, **absolute rotation**, **absolute scale**.

absolute value 1. See **absolute location**. 2. The absolute value of a negative number is its positive counterpart. For example, the absolute value of negative 8 (-8) would be 8.

absolute vector Any **vector** whose **end points** are defined in **absolute coordinates**. See **relative vector**.

A-buffer Abbreviation for **accumulation buffer**. The A-buffer is used to create an **image** by accumulating and merging several images together. It is often used with **hardware rendering** techniques to produce **anti-aliasing**.

A-buffer rendering See **A-buffer**.

A/B wind A/B wind refers to the position of the **film emulsion** relative to the center of the wound-up **film**. The emulsion faces inward toward the center of an A-wind, while the emulsion of a B-wind faces outward away from the center of the **roll**. A-wind film is more commonly used for **release prints**, while B-wind film is generally used for **negative**.

AC Abbreviation for **Assistant Cameraman (AC)**.

Academy 1. See **Academy standards**. 2. See **Academy aperture**. 3. See **Academy of Motion Picture Arts and Sciences (AMPAS)**.

Academy aperture A standard **35mm film format** whose **image** area and its center are positioned to the right of center on the **negative** to allow for the narrow band reserved for the **sound track**. Academy aperture is usually masked on the **release print** or during **projection** to an **aspect ratio** of **1.85**. The aspect ratio of the image area **captured** is 1.37, and the typical working **image resolution** is 1828×1332 before any 1.85 masking occurs. The image area actually captured on **film** is equal to $.864" \times .63"$. Also called **Full Academy Aperture**, **standard 35mm**. See also **full aperture**, **Super 35**, *images under film extraction*, *Vista Vision*.

Academy Award The gold statuette given as the prize to **film** artists and technicians for the highest achievement in the various categories of **film-making** by the **Academy of Motion Picture Arts and Sciences (AMPAS)**. Also called the **Oscar**.

Academy Awards The annual awards given to the **film** artists and technicians by the **Academy of Motion Picture Arts and Sciences (AMPAS)** for recognition of their work in their various areas of specialty. Within the **visual effects (VFX)** industry, the category for the best visual effects is the most coveted award. With the development of new technologies for the creation of visual effects, the technical achievement award has also become highly prized.

Academy leader The standardized length of **film** attached by the **lab** at the **head** and **tail** of **release prints** that meets the standards specified by the **Academy of Motion Picture Arts and Sciences (AMPAS)**. The leader contains a countdown running from 8 to a single **frame** of 2, which is ac-

accompanied by a pop on the **sound track**, for use by the lab in audio lineup and later to signal the **Projectionist** to the start of the film. Sometimes referred to as **full Academy leader**. See also **Universal leader**.

Academy mask An **overlay** used to **mask** a portion of an **image**, **camera**, or **projector** to **display** the images with the standard **Academy aperture** format. See also **Academy leader**, **Academy standards**.

Academy of Motion Picture Arts and Sciences (AMPAS) The professional organization that includes branches for almost every area of filmmaking and encourages continued artistic and technical research and development in the industry. The Academy, which was organized in 1927, began with only 26 members, and has grown to over 6,000 members, with membership by invitation only.

Academy of Motion Picture Sound (AMPS) An organization that promotes and encourages the continued creative and technical development of all aspects of **sound** recording and reproduction for **film**.

Academy standards The technical requirements established by the **Academy of Motion Picture Arts and Sciences (AMPAS)** in order to enforce global standards across the **film industry**.

accelerated motion See **fast motion**.

accelerator 1. Any combination of keystrokes used as a substitute for the equivalent **mouse command**. 2. See **accelerator board**.

accelerator board A special **circuit board** that replaces the **central processing unit (CPU)** of a **computer** with a faster one.

accelerator card A special **circuit board** that plugs into one of the **expansion slots** of a **computer** to make it run faster. See also **graphics accelerator card**.

access To use a **computer** resource.

access code See **password**.

access denied A message that sometimes appears when access is denied to a requested **file**. Access might be denied because the file is currently in use or because use of that file is restricted to specific **users**. See also **permission mask**.

access privileges To have approved access to **log in** to a **computer**. See **login account**, **password**.

accessory See **peripheral device**.

Accom 1. The company that designs, manufactures, sells, and supports a line of **digital** audio and **video** products. 2. A **Digital Disk Recorder (DDR)** used for **image** recording and **real-time playback**.

account See **login account**.

accumulation buffer See **A-buffer**.

ACE Abbreviation for **American Cinema Editors (ACE)**.

acetate base The **film base** on which the light-sensitive photographic **emulsion** is placed. **Acetate-based films** are relatively fire resistant and chemically stable compared to their earlier **nitrate-based** counterparts, which were highly combustible and deteriorated rapidly over time.

acetate-based film Any **film stock** containing an **acetate base**. See **nitrate-based film**.

acetate cel See **animation cel**.

acetate film An **acetate-based film** that is fire resistant. Also called **safety film**.

acetate sheet See **animation cel**.

achromatic An **image** without **color**. Neutral colors that are **desaturated** and have a low **chroma** are achromatic. These colors can be described as dull and muted, and generally are made up of just shades of gray.

ACM Abbreviation for **Association for Computing Machinery (ACM)**.

Acmade The machine that prints **Acmade code** onto **film**. See **edge numbers**.

Acmade code The code printed on a **dailies** roll of **film**, assigned by the **Editorial Department**.

ACM SIGGRAPH See **SIGGRAPH**.

acquisition format A term used to describe the **film format** used to **capture** the **images**. For example, **Cinemascope** and **Super 35** are often used to capture images when the desired delivery format is **2.35:1**.

Acrobat A **program**, from **Adobe Systems, Inc.**, that reads and converts documents to the **portable document format (PDF)**. PDF files are a **platform independent** means of reading and printing documents.

Acrobat reader See **Acrobat**.

action 1. The command called by the **Director**, after the **camera** reaches **speed**, to indicate to the **Crew** and actors the start of a **take**. Opposite of **cut**. 2. The movement of the actors or **objects** in front of the camera.

action axis The action axis is the imaginary line drawn at a 180-degree angle between the **subject** and their line of travel relative to the position of the **camera**. In order to maintain **directional continuity**, the camera must remain on the same side of the action axis between **shots**.

action safe See **safe action**.

action still A single **image** taken directly from the **film negative** for use in publicity. See also **production still**.

active An option becomes active when it is **clicked** on. An active option will generally be denoted with a small red check mark or an X, whereas an **inactive** option will not. See also **check box**.

active bodies See **active rigid bodies**.

active region The portion of a **video signal** that is used for actual **image** information, as opposed to the area reserved for **closed-captioning** and **time code**.

active rigid bodies **Rigid body objects** that react to **dynamics**, as opposed to **passive rigid bodies** that act only as **collision objects** for active bodies.

active window The **window** currently in use on a **graphical user interface (GUI)**. A window is made **active** by **clicking** or **pointing** the **cursor** in it with a **mouse** or **stylus**. Once a window is active, it appears in front of any other open windows on the **screen**, and the **user** can type, draw, or perform any function provided by the particular **application** that created that window. Typically, only one window can be active at a time.

actual footage In most cases, this refers to the amount of **footage** that must be hand drawn or digitally **animated** in a **scene** and will be less than or equal to **screen footage**. However, if the scene is 96 **frames** or 6 **feet** ($16 \times 6 = 96$), but the **animation** is 4 repetitions of a 24-frame **cycle**, then the actual footage would be only 24 frames or 1 foot, 8 frames ($16 + 8$). See also **film footage**, **feet+frames**.

AD Abbreviation for **Assistant Director (AD)**.

adaptive subdivision A sophisticated **polygonal subdivision** technique that takes advantage of the fact that **flat surfaces** require far fewer **polygons** than do **curved surfaces** for accurate representation. The number of polygons used in adaptive subdivision is entirely dependent on the curvature of the **surface** being converted for **rendering**.

A/D converter Abbreviation for **analog to digital converter (A/D converter)**.

add 1. For **compositing**, see **addition operation**. 2. A standard **arithmetic operator**. 3. For **Boolean operations**, see **union operation**.

addition See **addition operation**.

additional camera Any extra **camera** used to **shoot** complex **stunts** or action **scenes**.

additional photography A term used to describe the **shooting** of additional **scenes** or the reshooting of particular scenes due to a negative reaction from **Filmmakers**, **studio** executives, or **focus groups** to work already **shot**. Also called **pickups**, **reshoots**, or **pickup shots**.

addition operation 1. A **compositing operation** that adds a **constant value** to each **pixel** in a single **image** or adds together the pixels of two images. If working with **normalized values**, any resulting **RGB values** greater than 1 are **clamped** to a **value** of 1. However, many **compositing packages** offer the ability to specify a **clamping value** of greater than or less than 1. Opposite of **difference operation**. 2. For **Boolean operations**, see **union operation**.

additive color model A **color model** in which adding equal amounts of the **primary colors**—**red (R)**, **green (G)**, and **blue (B)**—creates **white**. Additive color models are used with **CRT monitors** and **RGB images**. Opposite of **subtractive color model**. See **RGB color model**, *Color Plate 3*.

additive colors See **additive primary colors**.

additive primaries See **additive primary colors**.

additive primary colors The three additive primary colors are **red (R)**, **green (G)**, and **blue (B)**. Almost all **colors** can be created by adding these colors together. **White** is the result of these colors mixed together in equal amounts. See **additive color model**, **subtractive primary colors**.

addmix A **compositing operation** that **composites** a **foreground element** over a **background element** based on **curves** from both **elements** that control how the **foreground alpha** is used to multiply the two **images** before **adding** them together.

add operation See **addition operation**.

address 1. The location where **data** is stored on a computer **disk**, **peripheral device**, or in **computer memory (RAM)**. Also referred to as the **location**. 2. See **Internet address**. 3. See **electronic mail address (e-mail address)**.

address track A track on a **videotape** specifically reserved for **time code**. See **longitudinal time code (LTC)**.

address track time code See **longitudinal time code (LTC)**.

adjacent polygons **Polygons** that share common **edges**. **Smooth shading** can then be achieved across **polygonal surfaces** by using **averaged normals**.

Admin See **System Administrator**.

Administrator See **System Administrator**.

ADO Abbreviation for **Ampex Digital Optics (ADO)**.

Adobe Acrobat See **Acrobat**.

Adobe Illustrator A drawing **software** developed by **Adobe Systems, Inc.** for **Macintosh** and **Windows**.

Adobe Systems, Inc. A pioneering company that developed **portable document format (PDF)**, **Acrobat**, **Photoshop**, **After Effects**, and **Illustrator**, to name just a few.

Adobe Systems PostScript Page Description Language A **page description language (PDL)** implemented in its current form by **Adobe Systems, Inc.** in 1982. See also **PostScript**.

ADR Abbreviation for **Automatic Dialogue Replacement (ADR)**.

ADR editing See **Automatic Dialogue Replacement (ADR)**.

ADR Editor See **Automatic Dialogue Replacement Editor (ADR Editor)**.

ADR Mixer See **Automatic Dialogue Replacement Editor (ADR Editor)**.

ADSL Abbreviation for **Asymmetric Digital Subscriber Line (ADSL)**.

advance The distance between the **sound track** and the **image area** on **film** or a **projector**.

advance screening See **preview**—Definition #2.

Advanced Interactive Executive (AIX) A **Unix-like operating system (OS)** designed for use on IBM workstations.

advanced television (ATV) One of many systems proposed for the new **digital** television standards. See also **high definition television (HDTV)**, **digital television (DTV)**.

aerial Shorthand for **aerial shot**.

aerial perspective See **atmospheric perspective**.

aerial shot Any extreme **high-angle shot** filmed from a high vantage point, such as a plane or mountain, to depict a vast area from a long distance.

affine Linear **geometric transformations** including **pan**, **rotate**, **scale**, and **shear**.

After Effects A **compositing package** owned by **Adobe Systems, Inc.** for **Macintosh** and **Windows**.

AGC Abbreviation for **Automatic Gain Control (AGC)**.

age See **particle age**.

aggregate object An **object** made up of multiple **primitives**.

AI Abbreviation for **artificial intelligence (AI)**.

AIFF Abbreviation for **Audio Interchange File Format (AIFF)**.

aim constraint A type of **constraint** used to orient the **axis** of one **node** in the direction of another node.

aims Shorthand for **lab aims densities (LAD)**.

aims girl See **LAD girl**.

airbrush A type of **digital paintbrush** available in **paint packages** that mimics traditional airbrush techniques.

AIX Abbreviation for **Advanced Interactive Executive (AIX)**.

AL Abbreviation for **artificial life (AL)**.

alert box See **error dialog**.

alert message See **error message**.

algorithm A mathematical **expression** or **procedure** following a precise set of rules that specify how to solve a problem. It frequently involves many repetitions of a particular **operation**. See also **rendering algorithm**, **shading algorithm**.

alias 1. A **user-defined** abbreviation, usually short and easy to remember, of the longer keyboard **command**. These aliases are usually stored in a **dot file** in the **home account** of each **user** and are **sourced** into **computer memory** at the time of **login**. Each time the **computer** receives one of these aliased commands, its **command interpreter** expands it out to its full **syntax** without needing to reference any file. For example, a common alias used in **Unix** for the command “history” is simply “h.” 2. See **aliasing**.

Alias A **3D software package** that has, for the most part, been replaced by **Maya**. See **Alias/Wavefront**.

aliasing The jagged **artifacts**, sometimes referred to as **jaggies** or **stairstepping**, seen in the diagonal and curved **edges** of an **image** when displayed on a **digital device** with a limited number of **pixels**. For example, if viewing a **black and white** image on a **display** that cannot show intermediate levels of gray, then a pixel will be completely **black** if it falls within a black area and completely **white** if it falls within a white area. With **anti-aliasing** applied, the jagged edges can be removed by calculating and inserting an intermediate shade of gray between adjacent pixels to give smoother **transition** of **values** to the display. The term aliasing is also used in a more global sense to describe any type of **sampling** artifact, such as **wagon wheeling** and **strobing**.

Alias/Wavefront The company responsible for manufacturing a large variety of **2D** and **3D software packages**, such as **Maya** and **Composer**. For years, the two companies, Alias Research Inc. and Wavefront Technologies, were competitors until their merger in 1995.

alignment tone See **reference tone**.

alpha 1. Shorthand for **alpha channel**. 2. Shorthand for **alpha software**.

alpha channel **Digital images** typically store their information in four **channels**—**red (R)**, **green (G)**, **blue (B)**, and the alpha, or **matte channel**. The alpha channel is a **grayscale image** that describes the **opacity** of the corresponding **color channels** with **black** being completely **transparent** and **white** being completely **opaque**. When **compositing** the **foreground** image **over** another image, it is the gray **values** of the alpha channel that determine what percentage of the color channels appear over the **background** image. *See also Color Plates 12, 19, 23–25, and image under erode.*

alpha component See **alpha channel**.

alpha copy 1. An **image operation** in which the **alpha channel** of one **image** is copied into the alpha channel of another. Also called **switch matte**. *See also channel swapping.* 2. See **alpha software**.

alphanumeric See **alphanumeric characters**.

alphanumeric characters Alphanumeric characters consist of only the letters A–Z and digits 0–9.

alpha release The official release of **alpha software**. *See also beta release.*

alpha software A very early prerelease **version** of **software** that precedes the **beta release**. Alpha software is often only **released** for **in-house** testing, although some **vendors** will send copies out to their longtime **users** for testing and feedback.

alpha version See **alpha software**.

alphaware See **alpha software**.

alternating triangles A method of connecting the **points** that make up a **polygon mesh**, in which each connecting triangle is oriented in the opposite direction of its surrounding **triangles**. See also **rows and columns**, **quadrilaterals**, **polygon detail**.

Amazon Paint A **paint software** developed and sold by Interactive Effects, Inc.

ambient 1. See **ambient color**. 2. See **ambient light source**, *image under diffuse*.

ambient coefficient See **ambient component**.

ambient color The **color** of an **object** in response to **ambient light**. See also **diffuse color**, **specular color**.

ambient component The amount of **ambient light** striking a **surface**. See also **diffuseness**, **specularity**.

ambient light 1. For **computer graphics (CG)**, a directionless **light source** that uniformly distributes **light** in all directions, and all **objects** are equally illuminated regardless of their orientation. Ambient light sources are often used to simulate the indirect illumination of light bounced off of other objects in the **environment** that we see in the real world. The need for ambient light is removed when using **radiosity**, as it computes the actual **light bounce** between objects. See also **directional light**, **spotlight**, **area light**, **point light**, **volume light**. 2. For **film**, the available light completely surrounding the **subject**, such as light already existing in the indoor or outdoor setting that is not created by additional lights.

ambient light source See **ambient light**.

ambient reflection **Reflections** striking a **surface** that are a result of an **ambient light source**.

ambient value See **ambient component**.

American Cinema Editors (ACE) The professional society for **film** and television **Editors**. Membership is by invitation only.

American Cinematographer Manual A manual, published by the **American Society of Cinematographers (ASC)**, that is considered to be the industry “Bible” for **Cinematographers**, as well as anyone involved in the field. It contains information about **cameras**, **lighting**, **filters**, **film speed** tables, and most other elements of **cinematography**.

American National Standards Institute (ANSI) ANSI is an organization that produces documents defining information standards for **input** and **output** interfaces. For example, this group sets the **ASA ratings** for **film**, and **ASCII** is an **ANSI character set**. ANSI, which was formerly named the **American Standards Association (ASA)**, is the American division of the **International Standards Organization (ISO)**. See also **Deutsche Industrie Norm (DIN)**.

American Society of Cinematographers (ASC) The nonprofit organization dedicated to the continued advancement of the art of **cinematography** through technical and artistic growth. The society publishes the ***American Cinematographer Manual*** and the monthly magazine *American Cinematographer*. See also **British Society of Cinematographers (BSC)**, **Canadian Society of Cinematographers (CSC)**.

American Standard Code for Information Interchange (ASCII) ASCII is a 7-**bit** code used for information exchange between **computers**. In general, the term ASCII refers to any **data** that is stored as a **text file** and does not require a **decoder** for reading. See also **ASCII characters**, **ASCII file**, **ASCII Table**.

American Standards Association (ASA) The former name of the committee now known as the **American National Standards Institute (ANSI)**.

American wide-screen Referring to a standard **film format**, common in the United States, that uses an **aspect ratio** of **1.85:1**. See also **European wide-screen**.

Amiga A line of **personal computers** that uses extra **microprocessors** for handling **graphics** and **sound** generation.

AMPAS Abbreviation for **Academy of Motion Picture Arts and Sciences (AMPAS)**.

Ampex Corporation The company that manufactures **digital** and electronic **image** storing products such as the **ADO**, **D2 video format**, and **DST** data storage.

Ampex Digital Optics (ADO) A **hardware-based video** effects system manufactured and sold by **Ampex**.

amplitude The maximum distance between the waves of a periodic **curve** along the **vertical axis**. See also **frequency**, **phase**.

AMPS Abbreviation for **Academy of Motion Picture Sound (AMPS)**.

anaglyph A **stereo image** that requires the use of **anaglyph glasses**.

anaglyph glasses A type of **3D glasses** that uses two different lens **colors**, usually **red (R)** and **blue (B)**, to control the **images** that are seen by each eye in a **stereo film**. See also **flicker glasses**, **polarized glasses**.

analog Data that is composed of continually varying electronic **signals**. Unlike **digital** information, which is either on or off, analog information is represented by continuous change and flow, such as current or voltage. Sometimes spelled **analogue**.

analog computer Any **computer** that **processes data** with **analog** methods. An analog computer operates from data that is represented by directly measurable quantities, such as voltage or current. See **digital computer**.

analog data Any **data** represented in an **analog** form. Opposite of **digital data**.

analog monitor A **monitor** that can display **analog signals**, such as **composite video**.

analog signal The continuously variable electronic **signals** that make up **analog data**. See **digital signals**.

analog to digital conversion The process of converting an **analog signal** into a **digital** form. See **analog to digital converter (A/D converter)**.

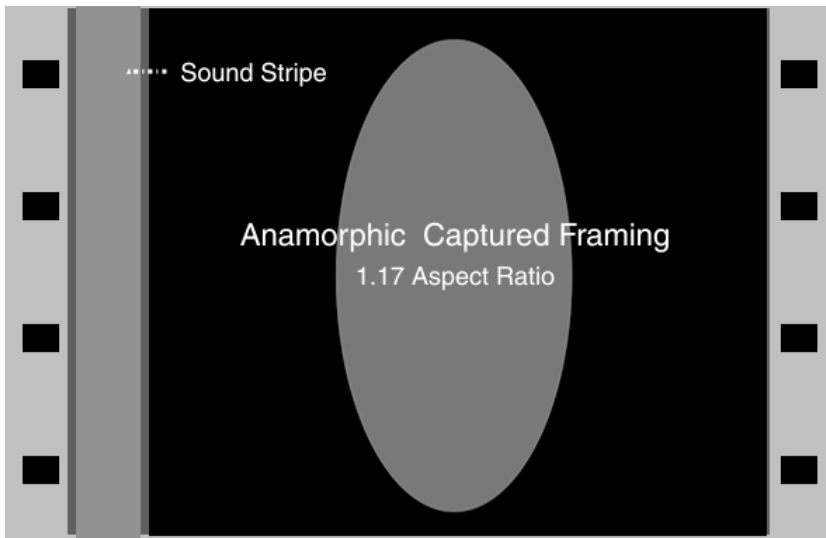
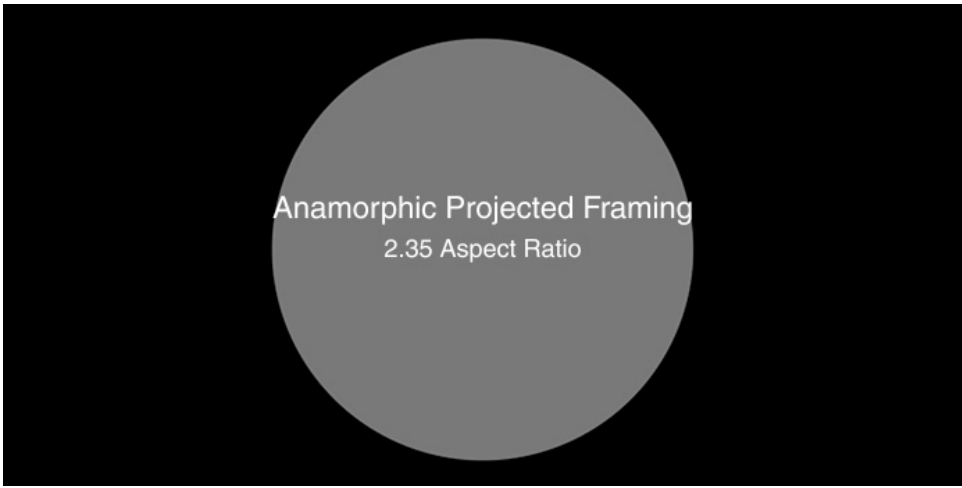
analog to digital converter (A/D converter) A **device** that converts an **analog signal** into its **digital** representation by taking **samples** of that **signal** at a fixed time interval, or **sampling rate**. The higher this sampling rate, the better the quality of the signal and, therefore, the more accurate the reconstruction of the original analog signal into its digital form. See also **Digital to Analog Converter (DAC)**.

analog sound A **sound track** that is composed of recorded electronic **signals** that are converted into **sound** signals. See **digital sound**.

analogue Another spelling for **analog**.

analog video Analog video records visual information as a series of continuous **analog signals** onto magnetically charged **videotape** that, when played back through proper **video** equipment, appear as moving **images**. Analog **video** read from **videotape** is subject to **image degradation** due to noise distortion, whereas a **digital video** is represented as unique and well-defined **samples**. Information stored as analog video can only be accessed using **sequential access**.

anamorphic A **wide-screen** film format that horizontally squeezes the **image area** captured on the **negative** during photography by using an



A circle as it will be **projected** with an **anamorphic lens** and the same circle as it was captured during **filming**.

anamorphic lens. At the time of **projection**, the image is **unsqueezed** by the inverse amount to make it look “normal” again. The actual size of the image area **captured** on **film** is equal to .838” × .7”. For 35mm **feature film** work, the standard anamorphic format is most often projected with a 2.35:1 **aspect ratio**. **Cinemascope** is the tradename of an anamorphic technique. See also **Techniscope**, **Superscope**, *Color Plate 28*, and *image above*.

anamorphic image Any distorted **image** that can be restored to its original, undistorted **format**. See **anamorphic**.

anamorphic lens A special **lens** that squeezes the original **image** by changing its **height-to-width** ratio. The most commonly used anamorphic lenses compress the **horizontal** image width by 50 percent. Opposite of **spherical lens**. See also **Cinemascope**, **normal lens**, **auxiliary lens**, **zoom lens**, **telephoto lens**.

anamorphic lens flare Any **lens flare** that is **filmed** using an **anamorphic lens**. See also **spherical lens flare**, **CG lens flare**, *Color Plates 27–29*.

anamorphic projection See **anamorphic format**.

anamorphic widescreen format See **anamorphic format**.

ancestor Any **node** in a **hierarchy** that is above another node. See **parent**.

anchor See **root**—Definition #1.

AND See **AND operator**.

AND operator 1. For **compositing**, see **plus operation**. 2. One of the **Boolean operators**. See **intersection operation**.

angle The **camera-to-subject** relationship in a **shot**.

angle of incidence The angle at which a **light ray** intersects the **surface** of an **object**. This is used to calculate the intensity of **light** striking a surface. The larger the angle of incidence, ranging from 0 to 90 degrees, the stronger the **specular component** relative to the **camera view**.

angle of view See **field of view (FOV)**.

angle-plus-angle shot A **shot** in which the **camera** is tilted either upward or downward relative to the **subject**. Angle-plus-angle shots create the strongest dimensional effect and eliminate the **2D** flatness of straight-on shots.

angular units The **units** used to define **rotations**, such as **degrees** or **radians**.

animate The process of creating **animation**.

animated Any characteristics, or **attributes**, that change over time are referred to as “animated.”

animated reveal See **reveal matte**.

animated texture A **texture map** that is sequentially replaced with a new **image** for each **frame** that is **rendered**.

animated wipe See **wipe transition**.

animatic A rough **animation** created to give a sense about the timing and **motion** of a **shot** or **sequence**. An animatic can range in complexity from a sequence of edited **storyboards** to a full **3D** representation of the **scenes**. Animatics often include rough music and sound effects to help get a sense of the work before it goes into **production**. An animatic created in **computer graphics (CG)** is often referred to as **previsualization**. Also called a **leica reel**.

animation Animation is the process of “giving life” to a **sequence** of still **images** that represent the illusion of **motion** over time. When a sequence of images is played back quickly enough, our eyes perceive them as in continuous motion. See **computer animation**, **stop motion animation**, **cel animation**, *Color Plates 47, 56, 57, 61–63, 67*.

animation camera A **camera** designed for **frame-by-frame photography** on an **animation stand**. The animation camera can be moved vertically to change the size of the **images** or to create the illusion of a **zoom**, while the table can be **translated** along the **X-** and **Y-**axes and **rotated** along the **Z-axis**.

animation cel The clear acetate sheets onto which the different **layers** of a **scene** are hand-drawn to produce **cel animation**. For example, one **cel** might be the **background (BG)**, while another might be a **character** walking across that background. Cel animation is produced by placing the transparent layers on top of each other and photographing them **frame by frame**. However, it should be noted that the background layer used in cel animation might also be created on paper or as a **digital image** over which all the other cels are layered. See *Color Plate 32*.

animation compress See **time warp**.

animation curve The **graphical representation** of the animated **parameters** of an **object**, **camera**, or **light**.

animation cycle A **sequence** of drawings or **images** that can be seamlessly played back by placing the first **frame** immediately after the last to suggest continuous action. Also called a **motion cycle**, **cycle**.

animation dailies **Dailies** shown specifically to the **character animation** team to review the latest round of **motion** in the **shots**. Also called **motion dailies**. However, for a small **show** or **facility**, dailies are often grouped into one global **screening** for all types of artists working on the **project**. See also **lighting dailies**, **effects dailies**, **stage dailies**.

Animation Department See **Character Animation Department**.

Animation Director The Animation Director is responsible for developing and supervising the behavior and **motion** of all **animated** characters that appear in the **film**. The scope of the **character animation** for the **project** will generally determine whether the Animation Director works for or is placed on the same level within the **show hierarchy** as the **Visual Effects Supervisor (VFX Sup)**. See also **Animation Supervisor**.

animation expand See **time warp**.

animation footage The amount of **footage** in a **scene** that needs to be **animated**. **Cel animated features** and, in some cases, **full CG features** track the length of a scene in terms of **feet+frames**. Also referred to as **scene footage**. See also **film footage**.

animation hierarchy The arrangement of levels from the **root node** down through the entire **hierarchy** that describes the **animation** controls and relationships for a group of **objects**.

Animation Lead For larger **projects**, a number of Animation Leads might be assigned to oversee the behavior and **motion** of the characters in a particular **sequence** or for an individual **character** across the entire **film**. Depending on the size of the project, the Animation Lead reports to the **Animation Supervisor** and/or the **Animation Director**.

animation module The portion of a **3D software package** used to create and modify **animation**.

animation package 1. Referring to the specific **software package** used for **animation**, such as **Maya**, **Houdini**, **Softimage**, **Lightwave**, or **3D Studio Max**. 2. A term used to describe a complete **station ID** in **broadcast graphics**. It is generally composed of a series of news, sports, and movie opens and **logo IDs** as a means of presenting a distinct and easily identifiable look and feel to the **viewer** for a particular television station.

animation parameter Any **attribute** that can be animated over time, such as **XYZ translation**, **rotation**, **scale**, **color**, **reflectivity**, or **transparency**.

animation replacement A technique in which an **Animator** copies the **animation** from one **character** to another character with the same **hierarchy**. This technique is often used in **crowd simulation** where the same animation can be applied to different but similar **models**. See also **geometry replacement**.

animation scale See **time warp**.

animation setup See **character setup**.

Animation Setup Supervisor See **Character Setup Supervisor**.

Animation Setup TD Abbreviation for **Animation Setup Technical Director (Animation Setup TD)**. See **Character Setup Technical Director (Character Setup TD)**.

Animation Setup Technical Director (Animation Setup TD) See **Character Setup Technical Director (Character Setup TD)**.

animation software A **software application** specifically designed to allow the **user** to **setup** and **animate** objects in **3D space**. Popular packages used for **animation** include **Maya**, **Houdini**, **Softimage**, **Lightwave**, and **3D Studio Max**. See also **animation package**, **modeling software**, **lighting software**, **compositing software**, **paint software**, **particle software**, **render software**, **tracking software**.

animation stand The **device** designed to hold and control the movement of **flat artwork** for the **camera** that photographs them **frame** by frame. For **cel animation**, each **cel** is held in place by pegs on the table to precisely position them. See also **animation camera**.

animation stretch See **time warp**.

Animation Supervisor Technically, the job of the Animation Supervisor is very similar to that of the **Animation Director**. Like all job descriptions, the role of the Animation Supervisor can change dramatically from **show** to show. If the show has an Animation Director, the Animation Supervisor reports to him or her and will most likely be responsible for supervising the animation of the characters based on the vision of the Animation Director. In the absence of the Animation Director, the Animation Supervisor reports to the **Visual Effects Supervisor (VFX Sup)** and is responsible for all the **Digital Characters** in the show.

Animation TD Abbreviation for **Animation Technical Director (Animation TD)**. See **Character Setup Technical Director (Character Setup TD)**.

Animation Technical Director See **Character Setup Technical Director (Character Setup TD)**.

Animator This is a very broad term with different meanings depending on the **facility**. In general, an Animator is any artist who creates **animation**. An Animator draws individual **frames** by hand for **cel animation**, manipu-

lates the **models** in **stop motion animation**, and creates **key frames** that **interpolate** over **time** in **computer animation**. See also **CG Animator**, **Character Animator**.

animatronic A **puppet** whose **motion** is brought to life through remote control, cable control, **computer** control, or hand puppetry. See also **servo**.

Anime A Japanese **animation** style whose roots originated from Japanese comic books. Anime covers a wide variety of subject matter and is most often characterized outside of Japan as science fiction and fantasy **films** with adult themes.

Animo A **2D software package**, developed by Cambridge Animation, that is used for **cel animation**.

anisotropic Having properties that differ based on the direction of measurement. Opposite of **isotropic**.

ANN Abbreviation for **artificial neural network (ANN)**. See **neural network (NN)**.

answer print The first **print** from the **lab** containing synchronized **image** and **sound** that has been **color balanced** to accommodate all the **scenes**. More often than not, this first print, also called the **first answer print**, needs further adjustments and is followed by a **second answer print**, **third answer print**, and so on before it is accepted as final and the **release prints** can be made. Also called an **approval print**.

ANSI Abbreviation for **American National Standards Institute (ANSI)**.

ANSI Character Set See **ASCII characters**.

anti-aliasing A **rendering** technique used to make jagged **edges**, referred to as **jaggies** or **stairstepping**, appear smoother by inserting **pixels** of an intermediate **color** between adjacent pixels with abrupt edges.

anticipation A classic **character animation** technique used to simulate an anticipation of **motion** in a **character** in which a brief action in the opposite direction precedes and foreshadows the main action.

anti-glare screen A specially designed **screen** that is attached to the front of the **computer** screen to reduce glare.

anti-halation backing The dark gelatin coating used on the back of **unexposed film stock** in order to reduce **halation** by absorbing any **light** that might pass through the **emulsion**.

anti-virus program Any **program** that detects and removes **computer viruses**.

anti-virus software See **anti-virus program**.